

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS BCS Level 6 Professional Graduate Diploma in IT

KNOWLEDGE BASED SYSTEMS

23rd April 2007, 10.00 a.m.-1.00 p.m.

Answer THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

Calculators are NOT allowed in this examination.
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1. Knowledge based Systems (KBS) are developed to deal with particular application domains in which elements of human intelligence are essential in producing solutions.
 - a) Identify and discuss FIVE aspects of human intelligence that could be used to characterise intelligent knowledge-based systems. **(10 marks)**
 - b) Take ONE aspect of human intelligence and explain how it would be difficult to emulate using rule based systems. **(5 marks)**
 - c) Describe when and how a KBS should be tested. **(5 marks)**
 - d) Suggest measures that could be applied to increase the reliability of decision making by a KBS. **(5 marks)**

2. Knowledge elicitation involves modelling the knowledge used by an expert to solve problems. Consider an example application domain and construct a knowledge base for the domain by completing the following tasks:
 - a) Describe briefly general methods that could be applied to elicit the knowledge needed to solve a small complex problem. **(5 marks)**
 - b) Identify a suitable task, and produce a decision tree of five levels to represent the decision process. **(5 marks)**
 - c) Illustrate the consistency of the decision tree with a worked example using sample data for the task (specify any assumptions made). **(10 marks)**
 - d) Explain why it would be difficult to develop a KBS for a domain in which there was a considerable reliance on tacit and implicit knowledge. **(5 marks)**

3. Problem solving involves both inference and searching for a solution.
 - a) Explain the principle of rule inference and describe both forward and backward chaining using illustrative examples. **(15 marks)**
 - b) Explain both brute-force and heuristic search methods and discuss their relative merits. **(10 marks)**

Turn over]

4. Development of any software system requires careful assessment of risk in order to ensure that a quality product is produced. Consider the risks that should be anticipated for the construction of an interactive rule-based advisory system by addressing the following tasks:
- a) Identify all the main stakeholders involved in the project, and explain their respective roles and responsibilities in the construction of an intelligent knowledge based system. **(10 marks)**
 - b) Explain FIVE significant risks to the success of a KBS development project, and for each describe suitable measures that should be taken to mitigate against the risk. **(15 marks)**
5. Artificial Intelligence (AI) arguably has struggled to make an impact on real world solutions. Select any AI technology and discuss how it has successfully made the transition from laboratory to workplace or home. Focus on the real problems that the technology addresses and the benefits perceived to have been realised. **(25 marks)**